

Fishery Data Series No. 06-15

**Deep Creek Coho Salmon Escapement Studies,
2001 and 2002**

by

Robert N. Begich

April 2006

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative Code	AAC	fork length	FL
deciliter	dL			mid-eye-to-fork	MEF
gram	g	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	mid-eye-to-tail-fork	METF
hectare	ha			standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.		
meter	m			Mathematics, statistics	
milliliter	mL	at	@	<i>all standard mathematical signs, symbols and abbreviations</i>	
millimeter	mm	compass directions:		alternate hypothesis	H _A
		east	E	base of natural logarithm	<i>e</i>
		north	N	catch per unit effort	CPUE
		south	S	coefficient of variation	CV
		west	W	common test statistics	(F, t, χ^2 , etc.)
Weights and measures (English)		copyright	©	confidence interval	CI
cubic feet per second	ft ³ /s	corporate suffixes:		correlation coefficient (multiple)	R
foot	ft	Company	Co.	correlation coefficient (simple)	r
gallon	gal	Corporation	Corp.	covariance	cov
inch	in	Incorporated	Inc.	degree (angular)	°
mile	mi	Limited	Ltd.	degrees of freedom	df
nautical mile	nmi	District of Columbia	D.C.	expected value	<i>E</i>
ounce	oz	et alii (and others)	et al.	greater than	>
pound	lb	et cetera (and so forth)	etc.	greater than or equal to	≥
quart	qt	exempli gratia		harvest per unit effort	HPUE
yard	yd	(for example)	e.g.	less than	<
		Federal Information Code	FIC	less than or equal to	≤
Time and temperature		id est (that is)	i.e.	logarithm (natural)	ln
day	d	latitude or longitude	lat. or long.	logarithm (base 10)	log
degrees Celsius	°C	monetary symbols		logarithm (specify base)	log ₂ , etc.
degrees Fahrenheit	°F	(U.S.)	\$, ¢	minute (angular)	'
degrees kelvin	K	months (tables and figures): first three letters	Jan, ..., Dec	not significant	NS
hour	h	registered trademark	®	null hypothesis	H ₀
minute	min	trademark	™	percent	%
second	s	United States (adjective)	U.S.	probability	P
		United States of America (noun)	USA	probability of a type I error (rejection of the null hypothesis when true)	α
Physics and chemistry		U.S.C.	United States Code	probability of a type II error (acceptance of the null hypothesis when false)	β
all atomic symbols		U.S. state	use two-letter abbreviations (e.g., AK, WA)	second (angular)	"
alternating current	AC			standard deviation	SD
ampere	A			standard error	SE
calorie	cal			variance	
direct current	DC			population	Var
hertz	Hz			sample	var
horsepower	hp				
hydrogen ion activity (negative log of)	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

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by
Robert N. Begich
Alaska Department of Fish and Game, Division of Sport Fish, Homer

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1565

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Robert N. Begich

*Alaska Department of Fish and Game, Division of Sport Fish
3298 Douglas Place, Homer, AK 99603-8027, USA*

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ABSTRACT

Coho salmon *Oncorhynchus kisutch* returns to Deep Creek were assessed with a weir to provide inriver return and escapement, from August 2-September 10, 2001, and from August 1-September 11, 2002. In 2001, escapement was 3,745 coho salmon; escapement was 6,089 coho salmon in 2002. Females comprised 44% (SE = 3%) and 46% (SE = 2%) of the 2001 and 2002 coho salmon escapement, respectively. The age class composition of the coho salmon escapements were dominated by age 2.1, accounting for 84% (SE = 2%) of the 2001 escapement and 87% (SE = 2%) of the 2002 escapement.

Keywords: coho salmon, *Oncorhynchus kisutch*, Deep Creek, weir, return, escapement, adipose finclip, coded wire tag.

INTRODUCTION

The Lower Cook Inlet (LCI) Management Area includes all freshwater drainages of the Kenai Peninsula which flow into Cook Inlet from the Kasilof River drainage south to Gore Point. On the west side of Cook Inlet the management area comprises freshwater drainages of Cook Inlet south of Chisik Island and north of Cape Douglas (Figure 1). Coho salmon *Oncorhynchus kisutch* stocks are widely distributed throughout the area and spawn in a variety of freshwater habitats. Coho salmon are harvested in several fisheries. Before returning to natal systems, coho salmon are harvested to an unknown degree in mixed-stock marine sport and commercial fisheries. Adult coho salmon are also targeted inriver by sport anglers.

Sport fishing effort in road accessible tributaries of the LCI management area averaged about 60,000 angler days annually for all species for 1977-2002 (Howe et al. 1995, 1996, 2001 a-d; Jennings et al. 2004, *In prep*; Mills 1979-1980, 1981a-b, 1982-1994; Walker et al. 2003). Directed freshwater recreational fisheries for native coho salmon occur primarily at three roadside streams, Deep Creek, Anchor River, and Ninilchik River and to a lesser extent at Stariski Creek (Figure 2). Annual coho salmon harvest from the three primary streams averaged about 4,000 fish from 1977-2002, of which approximately 30% of the harvest was supported by the inriver fishery at Deep Creek (Howe et al. 1995, 1996, 2001 a-d; Jennings et al. 2004, *In prep*; Mills 1979-1980, 1981a-b, 1982-1994; Walker et al. 2003). Harvest of coho salmon at Deep Creek was relatively stable from 1977-2002 (Figure 3).

A road accessible coho salmon fishery supported by hatchery-stocked fish also takes place at Homer Spit. Because of the potential for hatchery fish to mix with wild stocks, this project provides an opportunity to determine if straying is occurring. The 2001 and 2002 hatchery-produced returns to Homer Spit comprised fish from the 2000 and 2001 late-run releases, ocean age-1 as well as an early-run coho salmon return component that was first released during 2001. A portion of coho salmon released into the Homer Spit lagoon in 2000 and early-run fish released during 2001 were marked with an adipose finclip, whereas, the 2001 late-run release group was unmarked (Loopstra et al. 2002, Loopstra and Hansen 2005).

There are no biological or sustainable escapement goals (BEG and SEG) for any of the coho salmon stocks in the LCI management area because sport and commercial harvests of most stocks are not significant. However, there is a directed and significant sport fishery for coho salmon at Deep Creek, which was chosen as a stock for study and possible development of a BEG or SEG. Few coho salmon of Deep Creek origin are likely harvested in mixed-stock marine fisheries, so weir counts and sport fish harvest data are sufficient to estimate inriver returns and sport fish exploitation rates.

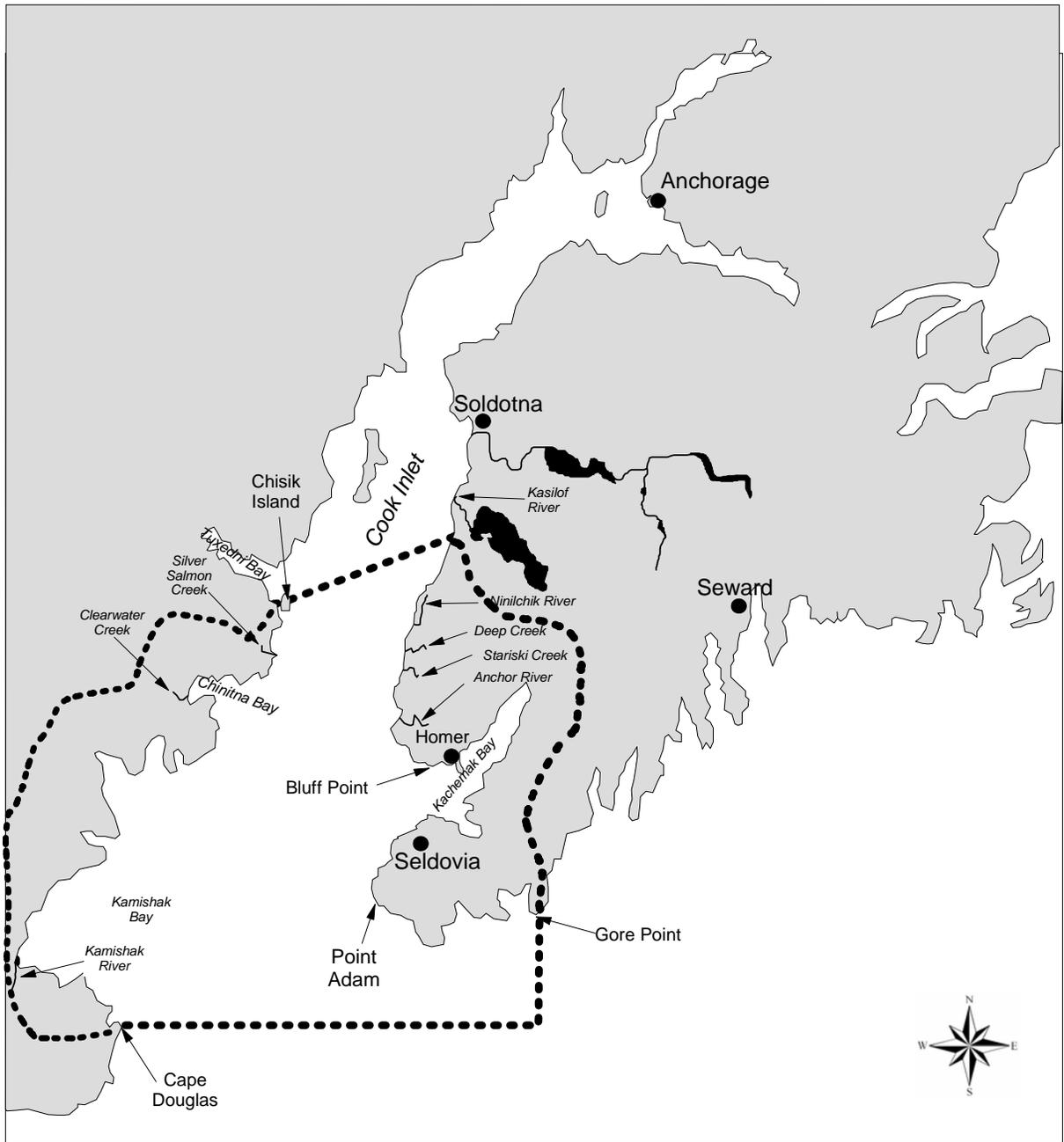


Figure 1.—The Lower Cook Inlet Management Area, 2001 and 2002.

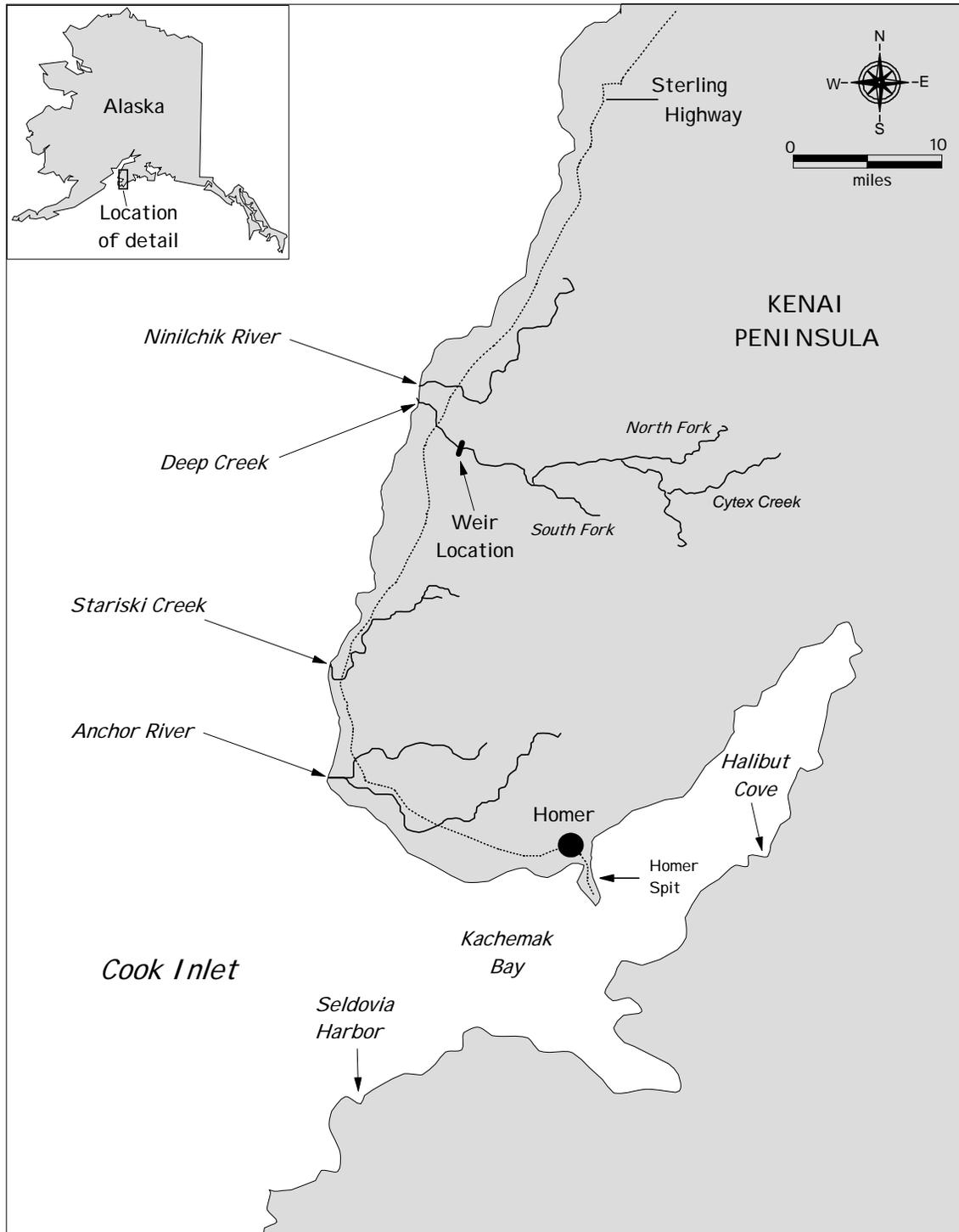


Figure 2.—Lower Cook Inlet road system and Deep Creek weir site, 2001 and 2002.

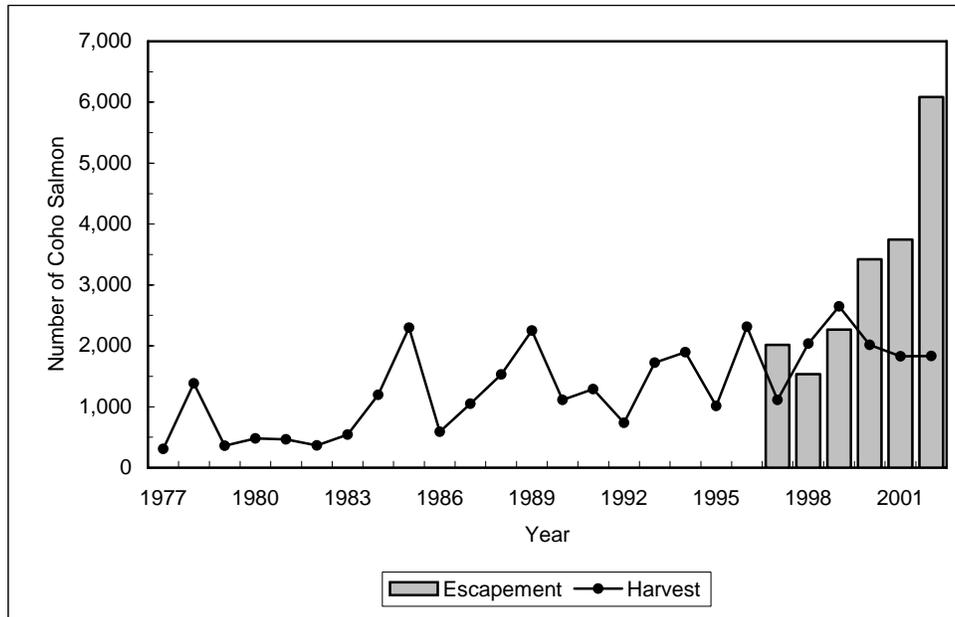


Figure 3.—Historical harvest and escapement of coho salmon at Deep Creek.

To gain a better understanding of coho salmon production from Deep Creek, determine if current exploitation is sustainable, collect information so that a BEG or SEG might be developed, and to assess straying to Deep Creek of coho salmon stocked at Homer Spit, Sport Fish Division initiated a study of coho salmon of Deep Creek in 1995. Coho salmon smolt were marked with coded wire tags (CWT) from 1995 through 1997 (Bendock 1996; King and Breakfield 1998, 1999, 2002), and in 2001, 2002 (Eskelin 2004). A weir has been operated to census the adult escapement from 1997 through 2002 (Table 1; Begich 2002; Begich and Evans 2005; King and Breakfield 1999, 2002).

OBJECTIVES

Objectives for 2001 and 2002 were to:

1. Census the escapement of coho salmon into Deep Creek.
2. Estimate the proportion by age, sex, and length classes of the escapement of coho salmon into Deep Creek.
3. Estimate the contribution of hatchery-produced coho salmon stocked at the Homer Spit Fishing Lagoon, to the Deep Creek escapement.

Table 1.—Estimated angler effort and harvest, weir count, inriver return and exploitation of coho salmon, Deep Creek, 1977-2002.

Year	Angler Effort ^a	Harvest ^a	Return to Weir ^b	Inriver Return ^c	SE	Inriver Exploitation ^d	SE	Number Sacrificed	Escapement
1977	11,399	306							
1978	13,872	1,383							
1979	12,560	362							
1980	8,796	478							
1981	10,127	464							
1982	12,149	366							
1983	13,505	545							
1984	15,760	1,197							
1985	19,802	2,301							
1986	17,354	588							
1987	16,734	1,050							
1988	12,115	1,528							
1989	13,414	2,254							
1990	23,567	1,111							
1991	17,048	1,290							
1992	15,226	737							
1993	19,535	1,722							
1994	18,357	1,895							
1995	12,727	1,014							
1996	9,629	2,313							
1997	9,712	1,115	2,017	3,132	312	0.356	0.064	0	2,017
1998	9,206	2,035	1,537	3,572	783	0.570	0.094	0	1,537
1999	11,367	2,651	2,267	4,918	569	0.539	0.053	2	2,265
2000	12,174	2,018	3,425	5,443	390	0.371	0.045	1	3,424
2001	7,834	1,828	3,747	5,575	502	0.328	0.061	2	3,745
2002	8,925	1,832	6,164	7,996	371	0.229	0.036	76	6,088
Average	13,573	1,322	3,193	5,106		0.399		1	2,598

^a Annual estimated total number of angler days and coho salmon harvest (Howe et al. 1995, 1996, 2001 a-d; Jennings et al. 2004, *In prep*; Mills 1979-1980, 1981a-b, 1982-1994; Walker et al. 2003).

^b Weir first installed at Deep Creek in 1997 and weir count includes coho salmon sacrificed for coded wire tag information.

^c Inriver return is sum of harvest and weir count.

^d Inriver exploitation is estimated harvest divided by inriver return.

METHODS

DATA COLLECTION

A floating weir utilizing resistance board technology was installed approximately 4 km upstream from the mouth of Deep Creek (Figure 2). Stream width at this location was 24.92 m and the weir consisted of 16 panels that measured 6.15 m long and 1.38 m wide, spanning 22.15 m of the stream. The remaining 2.88 m of the stream were sealed by erecting a fence to prevent upstream fish passage so that fish could be captured, counted, and sampled. Each panel consisted of 16 pieces of 2.54 cm schedule 40 plastic conduit sealed on both ends for floatation. Spacing between each piece of conduit was 3.81 cm. Two live traps were installed on the upstream side of the weir. The primary trap was installed at mid-stream and served as the primary fish pass under most flow conditions. The second was placed near-shore and also served as a fish pass during higher discharges as well as the primary fish pass when discharges prevented use of the mid-stream trap.

In 2001, the weir was installed on August 1 and was operated from August 2-September 10. In 2002, the weir operations began on August 1, the date it was installed, and continued through September 11, 2002. Coho salmon entered one of the traps to pass through the weir where they were counted and sampled. At the time of counting each coho salmon received a unique finclip. This mark was intended to prevent double counting and double sampling in the event of a weir failure and subsequent downstream-upstream migration of sampled fish.

All coho salmon counted at the weir were examined for an adipose finclip. In 2001, all coho salmon missing the adipose fin were sacrificed to detect straying from hatchery stockings at Homer Spit, sampled for age and measured for length as described below, and sex determined by internal examination of the gonads. In 2002, we systematically sacrificed every eighth coho salmon missing the adipose fin to detect strays from Homer Spit. Heads of sacrificed fish were removed, labeled with a numbered cinch strap, frozen, and later sent to the Mark, Tag and Age Laboratory (Tag Lab) in Juneau for detection and removal of the CWT. Decoding the tag number identified the time and location of tagging, and the presence of strays from other tagging locations.

All other coho salmon were sampled systematically for sex, age, and length. Sampling rates were based on previous escapements with the sample size determined under the assumption of multinomial sampling (Thompson 1987) and ease of implementation for technicians (i.e. sample sizes were rounded up to nearest 5 fish). Consequently, differing rates were applied between years. During 2001 every tenth coho salmon was sampled and during 2002 every fifteenth coho salmon was sampled.

Sampled coho salmon were measured for length from mid-eye to fork of tail (MEF) to the nearest millimeter. Three scales were collected for aging from the left side of the body, at a point on a diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin, two rows above the lateral line (Scarnecchia 1979). Later scales were pressed and age determined using procedures described by Mosher (1969). Sex was determined based on head shape, and presence of ovipositor, eggs, or milt.

DATA ANALYSIS

The return of coho salmon to the weir was the total number of unique fish counted through the weir. Inriver return was sport harvest estimated from the Statewide Harvest Survey plus return

to the weir. Escapement was the return to the weir minus fish sacrificed for CWT recovery. Biological data for coho salmon sacrificed for CWT information were omitted for estimating the biological characteristics of escapements.

A loglinear analysis (SAS proc Genmod) was performed to test for differences in sex and age composition of coho salmon among weeks and to detect interactions between the effects. These tests were used to describe changes in the biological characteristics of the coho salmon immigrations among weeks at the weir.

The proportion of coho salmon of sex i that were of age k was estimated as:

$$\hat{p}_{ik} = \frac{n_{ik}}{n_i}, \quad (1)$$

where:

n_{ik} = number of coho salmon out of n_i that were in age class k ; and,

n_i = number of coho salmon of sex i sampled that were ageable.

The variance of this proportion was estimated as:

$$\hat{V}ar(\hat{p}_{ik}) = \left[\frac{\hat{N}_i - n_i}{\hat{N}_i} \right] \frac{\hat{p}_{ik}(1 - \hat{p}_{ik})}{n_i - 1}, \quad (2)$$

where:

$\hat{N}_i = \frac{n_i'}{n'} N$, the estimated total number of coho salmon of sex i , with $n' =$ the total number of coho salmon sampled (ageable and unageable) and $n_i' =$ as the number of coho salmon of sex i (ageable and unageable) out of n' .

The total number of coho salmon of sex i and age class k , was estimated by:

$$\hat{N}_{ik} = \hat{N}_i \hat{p}_{ik}, \quad (3)$$

with variance estimated by:

$$\hat{V}ar(\hat{N}_{ik}) = \left[\frac{N}{n'} n_i' \right]^2 \hat{V}ar(\hat{p}_{ik}). \quad (4)$$

The proportion of coho salmon of age class k , in the total escapement through the weir was estimated by:

$$\hat{p}_k = \frac{n_k}{n}, \quad (5)$$

where:

n_k = the total number of coho salmon out of n that were of age class k ,

n = the number of coho salmon sampled that were ageable.

The variance of this proportion was estimated as:

$$\hat{V}ar(\hat{p}_k) = \frac{N - n}{N} \frac{\hat{p}_k(1 - \hat{p}_k)}{n - 1}. \quad (6)$$

The total number of coho salmon of age class k was estimated by:

$$\hat{N}_k = N\hat{p}_k, \quad (7)$$

with variance:

$$Var(\hat{N}_k) = N^2Var(\hat{p}_k). \quad (8)$$

The proportion of coho salmon of sex class i in the total escapement through the weir was estimated as for age except that n was replaced with n' .

RESULTS

2001

In 2001, return to the weir was 3,747 coho salmon and all were examined for adipose fins. The mid-point of the coho salmon immigration was August 22 (Figure 4; Appendix A1). Two coho salmon missing the adipose fin were sacrificed for CWT information (Appendix B1); however, subsequent dissection revealed that the heads contained no tags. Inriver return was 5,575 (SE = 502) coho salmon. Escapement was 3,745 coho salmon and no strays from Homer Spit were detected (Tables 1, 2 and Appendix A1). Inriver exploitation was 0.328 (SE = 0.061)

Age was determined for 276 of the 366 coho salmon sampled for age (Table 3). Loglinear analysis of the sex, age and week data found no evidence of interaction among the three factors. These results indicate that the age composition did not change over sex or weeks, and the sex composition did not change over weeks.

The estimated sex composition of the coho salmon escapement was 44% (SE = 3%) female with mean length 572 mm (SE = 4), and 56% (SE = 3%) male with mean length 576 mm (SE = 3; Table 3). The majority of the coho salmon escapement was 4-year fish, age class 2.1 (84%, SE = 2%) with a mean length of 578 mm (SE = 3 mm); 12% (SE = 2%) were age 1.1 with mean length 570 mm (SE = 8 mm). About 3% of the escapement was 5-year fish of age classes 2.2 and 3.1 (Table 3).

2002

In 2002, a total of 6,164 coho salmon were enumerated and examined for adipose fins at the weir. The immigration mid-point was August 23 (Figure 4; Appendix A2). A total of 377 fish without an adipose fin were counted of which 76 were sacrificed for CWT information (Table 2; Appendix B2). Escapement was 6,088 coho salmon (Table 1; Appendix A2). Among CWT recoveries, 59 were fish with readable tags that emigrated from Deep Creek as smolt during 2001, and 17 fish had no tag (Table 2; Appendix B2). The inriver return estimate was 7,996 (SE = 371) coho salmon. Inriver exploitation was 0.229 (SE = 0.036).

Biological data were collected from 481 coho salmon and age was determined for 348 of these fish. Results and interpretation of the loglinear analysis was identical to the loglinear analysis results for the 2001 coho salmon immigration. The estimated sex composition of the coho salmon escapement was 46% (SE = 2%) female with mean length 568 mm (SE = 3), and 54% (SE = 2%) male with mean length 566 mm (SE = 3; Table 4). Four-year fish of age class 2.1 comprised the majority of the escapement (87%, SE = 2%) with mean length 568 mm (SE = 2 mm), and 10% (SE = 2%) of the escapement was age class 1.1 with mean length 560 mm (SE = 7 mm).

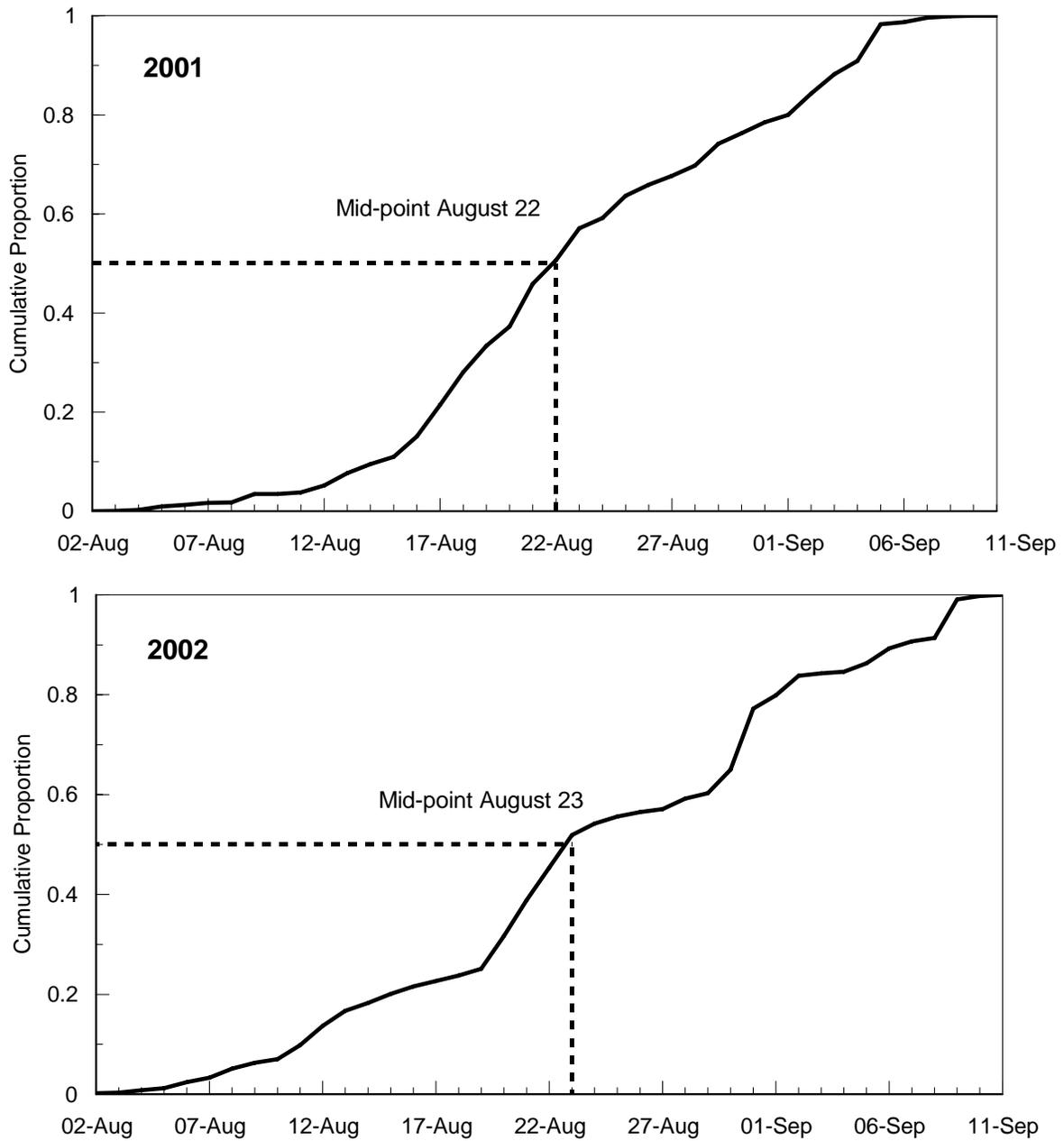


Figure 4.—Time of immigration for Deep Creek coho salmon, 2001 and 2002.

Table 2.—Coded wire tag recovery information for coho salmon sampled at Deep Creek, 2001 and 2002.

Recovery Year	Tag Code	Brood Year	Rearing Code and Location	Release Date	Release Site	Actual Age ^a		Female	Male	Sample Total
						Fresh	Ocean			
2001	NO TAG							1	1	2
2002	1301030813	1998	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20	2	1	22	37	59
2002	NO TAG							9	7	17
Total								31	44	76

^a Actual age was determined by comparing brood year with release date and year of capture as adult.

Table 3.—Age composition and length-at-age by sex of the coho salmon escapement at Deep Creek, 2001.

	Age				Total ^a
	1.1	2.1	2.2	3.1	
<u>Females</u>					
Number sampled	18	104	2	1	161
Estimated Proportion	0.144	0.832	0.016	0.008	0.440
SE Proportion	0.030	0.032	0.011	0.008	0.025
Estimated Abundance	237	1,371	26	13	1,647
SE Abundance	50	53	18	13	92
Mean Length (mm)	582	571	555	475	572
SE Mean Length (mm)	9	4	45		4
<u>Males</u>					
Number sampled	15	129	2	5	205
Estimated Proportion	0.099	0.854	0.013	0.033	0.560
SE Proportion	0.024	0.028	0.009	0.014	0.025
Estimated Abundance	208	1,792	28	69	2,098
SE Abundance	49	58	19	30	92
Mean Length (mm)	556	584	580	592	576
SE Mean Length (mm)	14	4	35	24	3
<u>All</u>					
Estimated Proportion	0.120	0.844	0.014	0.022	1.000
SE Proportion	0.019	0.021	0.007	0.008	
Estimated Abundance	448	3,162	54	81	3,745
SE Abundance	71	79	26	26	
Mean Length (mm)	570	578	568	573	577
SE Mean Length (mm)	8	3	24	27	3

^a Totals do not equal sum of the number sampled by sex due to illegible scales.

Table 4.—Age composition and length-at-age by sex of the coho salmon escapement at Deep Creek, 2002.

	Age			Total ^a
	1.1	2.1	3.1	
<u>Females</u>				
Number sampled	9	144	5	220
Estimated Proportion	0.057	0.911	0.032	0.457
SE Proportion	0.018	0.022	0.014	0.022
Estimated Abundance	161	2,569	89	2,785
SE Abundance	50	61	38	133
Mean Length (mm)	538	570	562	568
SE Mean Length (mm)	14	3	11	3
<u>Males</u>				
Number sampled	27	160	3	261
Estimated Proportion	0.142	0.842	0.016	0.543
SE Proportion	0.025	0.026	0.009	0.022
Estimated Abundance	475	2,817	53	3,304
SE Abundance	81	85	29	133
Mean Length (mm)	567	566	547	566
SE Mean Length (mm)	8	4	50	3
<u>All</u>				
Estimated Proportion	0.103	0.874	0.023	1.000
SE Proportion	0.016	0.017	0.008	
Estimated Abundance	630	5,318	140	6,088
SE Abundance	97	105	0	
Mean Length (mm)	560	568	556	567
SE Mean Length (mm)	7	2	18	2

^a Totals do not equal sum of the number sampled by sex due to illegible scales.

DISCUSSION

During 2001 and 2002 double counting due to downstream-upstream migration of coho salmon did not occur, consequently the weir operation at Deep Creek was a valid method to enumerate Deep Creek coho salmon escapement. Findings from this study contribute to the development of a Deep Creek coho salmon database to aid in assessment of stock dynamics. This information is particularly relevant to management of roadside coho salmon fisheries of the Lower Kenai Peninsula because of changing fishing pressures, land use practices, urbanization, and lack of information concerning population dynamics for other coho salmon stocks. Smolt production was estimated in 1996 and 1997 and smolt production estimates for 2001 and 2002 are pending. Furthermore, inriver return, escapement, inriver sport harvest, and inriver exploitation are available since 1997. Harvests since that time have been relatively stable, while escapement is trending upwards (Figure 3). In the future this information will allow us to evaluate adult coho salmon production and may help to develop an escapement goal and harvest strategy for Deep

Creek coho salmon. Therefore, I recommend that monitoring of adult coho salmon returns continue.

No coho salmon straying from Homer Spit stockings to Deep Creek was detected. Two adipose finclipped coho salmon were recovered in 2001 that did not have a tag and it is assumed that the fins could be naturally missing since smolt were not tagged in 2000. The 17 fish recovered at the weir during 2002 that had lost their tags are presumed to be coho salmon of Deep Creek origin and were tagged as smolt during 2001; previous work has indicated that no coho salmon CWT recoveries at Deep Creek have been of Homer Spit origin (Begich 2002; Begich and Evans 2005; King and Breakfield 1998, 1999, 2002). The distance between these two locations and lack of Homer Spit coho salmon present in the 2001 and 2002 returns to Deep Creek weir indicate that the Homer Spit coho salmon stocking program poses minimal risk to wild stock production in Lower Cook Inlet road system tributaries at and north of Deep Creek (Figures 1 and 2).

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**APPENDIX A. DAILY AND CUMULATIVE COHO SALMON
WEIR COUNTS**

Appendix A1.—Daily and cumulative counts of coho salmon, Deep Creek weir, August 1-September 10, 2001.

Date	Daily	Cum. ^a	Cum.
	Total		Prop. ^b
1-Aug	0	0	0.000
2-Aug	1	1	0.000
3-Aug	1	2	0.001
4-Aug	9	11	0.003
5-Aug	27	38	0.010
6-Aug	10	48	0.013
7-Aug	17	65	0.017
8-Aug	4	69	0.018
9-Aug	61	130	0.035
10-Aug	2	132	0.035
11-Aug	11	143	0.038
12-Aug	51	194	0.052
13-Aug	94	288	0.077
14-Aug	68	356	0.095
15-Aug	57	413	0.110
16-Aug	154	567	0.151
17-Aug	240	807	0.215
18-Aug	245	1,052	0.281
19-Aug	200	1,252	0.334
20-Aug	147	1,399	0.373
21-Aug	320	1,719	0.459
22-Aug	182	1,901	0.507
23-Aug	238	2,139	0.571
24-Aug	78	2,217	0.592
25-Aug	168	2,385	0.637
26-Aug	84	2,469	0.659
27-Aug	69	2,538	0.677
28-Aug	79	2,617	0.698
29-Aug	163	2,780	0.742
30-Aug	80	2,860	0.763
31-Aug	82	2,942	0.785
1-Sep	56	2,998	0.800
2-Sep	162	3,160	0.843
3-Sep	146	3,306	0.882
4-Sep	101	3,407	0.909
5-Sep	275	3,682	0.983
6-Sep	17	3,699	0.987
7-Sep	32	3,731	0.996
8-Sep	12	3,743	0.999
9-Sep	4	3,747	1.000
10-Sep	0	3,747	1.000
11-Sep	Weir Removed		

^a Includes two coho salmon sacrificed for coded wire tag information on 8/21 and 8/31.

^b Cumulative proportion of total return enumerated at the weir.

Appendix A2.—Daily and cumulative counts of unmarked and adipose finclipped (AFC) coho salmon, Deep Creek weir, August 1-September 11, 2002.

Date	Unmarked		AFC		Daily		Cum.	Number		Escapemen t
	Daily	Cum.	Daily	Cum.	Total ^a	Cum.	Prop. ^b	Sacrificed	Cum.	Cum. ^c
1-Aug	2	2	0	0	2	2	0.000	0	0	2
2-Aug	13	15	0	0	13	15	0.002	0	0	15
3-Aug	2	17	1	1	3	18	0.003	0	0	18
4-Aug	28	45	2	3	30	48	0.008	0	0	48
5-Aug	22	67	1	4	23	71	0.012	1	1	70
6-Aug	67	134	11	15	78	149	0.024	2	3	146
7-Aug	53	187	4	19	57	206	0.033	1	4	202
8-Aug	97	284	11	30	108	314	0.051	3	7	307
9-Aug	66	350	6	36	72	386	0.063	1	8	378
10-Aug	45	395	3	39	48	434	0.070	0	8	426
11-Aug	152	547	17	56	169	603	0.098	5	13	590
12-Aug	224	771	17	73	241	844	0.137	4	17	827
13-Aug	162	933	22	95	184	1,028	0.167	3	20	1,008
14-Aug	91	1,024	12	107	103	1,131	0.183	2	22	1,109
15-Aug	89	1,113	16	123	105	1,236	0.201	3	25	1,211
16-Aug	85	1,198	8	131	93	1,329	0.216	1	26	1,303
17-Aug	66	1,264	7	138	73	1,402	0.227	1	27	1,375
18-Aug	59	1,323	7	145	66	1,468	0.238	1	28	1,440
19-Aug	71	1,394	8	153	79	1,547	0.251	2	30	1,517
20-Aug	388	1,782	18	171	406	1,953	0.317	4	34	1,919
21-Aug	413	2,195	29	200	442	2,395	0.389	7	41	2,354
22-Aug	383	2,578	21	221	404	2,799	0.454	5	46	2,753
23-Aug	375	2,953	26	247	401	3,200	0.519	6	52	3,148
24-Aug	133	3,086	6	253	139	3,339	0.542	1	53	3,286
25-Aug	82	3,168	7	260	89	3,428	0.556	1	54	3,374
26-Aug	51	3,219	1	261	52	3,480	0.565	0	54	3,426
27-Aug	39	3,258	2	263	41	3,521	0.571	0	54	3,467
28-Aug	121	3,379	9	272	130	3,651	0.592	2	56	3,595
29-Aug	62	3,441	4	276	66	3,717	0.603	1	57	3,660
30-Aug	273	3,714	14	290	287	4,004	0.650	2	59	3,945
31-Aug	718	4,432	38	328	756	4,760	0.772	7	66	4,694
1-Sep	158	4,590	6	334	164	4,924	0.799	1	67	4,857
2-Sep	240	4,830	3	337	243	5,167	0.838	0	67	5,100
3-Sep	30	4,860	2	339	32	5,199	0.843	1	68	5,131
4-Sep	14	4,874	2	341	16	5,215	0.846	1	69	5,146
5-Sep	103	4,977	4	345	107	5,322	0.863	0	69	5,253
6-Sep	174	5,151	7	352	181	5,503	0.893	1	70	5,433
7-Sep	83	5,234	2	354	85	5,588	0.907	1	71	5,517
8-Sep	46	5,280	2	356	48	5,636	0.914	0	71	5,565
9-Sep	455	5,735	18	374	473	6,109	0.991	5	76	6,033
10-Sep	40	5,775	3	377	43	6,152	0.998	0	76	6,076
11-Sep	12	5,787	0	377	12	6,164	1.000	0	76	6,088
12-Sep	Weir Removed									

a Daily total is the sum of unmarked and adipose finclipped coho salmon.

b Cumulative proportion of total return enumerated at the weir.

c Escapement cumulative is cumulative daily total less number sacrificed at weir for coded wire tag information.

**APPENDIX B. LIST OF COHO SALMON CODED WIRE TAG
RECOVERIES, 2001 AND 2002**

Appendix B1.—List of coho salmon coded wire tag recoveries from Deep Creek, 2001.

Sample#	Recovery Location	Recovery Date	Tag Code ^a	Brood Year	State or Province	Rearing Code and Location	Release Date	Release Location
01DT2522	Deep Crk.	8/22/2001	NO TAG					
01DT2529	Deep Crk.	8/29/2001	NO TAG					

^a No tag indicates adipose finclip coho lost its tag between time of tagging as smolt and recapture as adult.

Appendix B2.—List of coho salmon coded wire tag recoveries from Deep Creek, 2002.

Sample#	Recovery Location	Recovery Date	Tag Code ^a	Brood Year	State or Province	Rearing Code and Location	Release Date	Release Location
02DT2503	Deep Crk.	8/5/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2504	Deep Crk.	8/6/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2504	Deep Crk.	8/6/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2505	Deep Crk.	8/7/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2506	Deep Crk.	8/8/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2506	Deep Crk.	8/8/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2506	Deep Crk.	8/8/2002	NO TAG					
02DT2507	Deep Crk.	8/9/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2509	Deep Crk.	8/11/2002	NO TAG					
02DT2509	Deep Crk.	8/11/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2509	Deep Crk.	8/11/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2509	Deep Crk.	8/11/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2509	Deep Crk.	8/11/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2510	Deep Crk.	8/12/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2510	Deep Crk.	8/12/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2510	Deep Crk.	8/12/2002	NO TAG					
02DT2510	Deep Crk.	8/12/2002	NO TAG					
02DT2511	Deep Crk.	8/13/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2511	Deep Crk.	8/13/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2511	Deep Crk.	8/13/2002	NO TAG					
02DT2512	Deep Crk.	8/14/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2512	Deep Crk.	8/14/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2513	Deep Crk.	8/15/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2513	Deep Crk.	8/15/2002	NO TAG					
02DT2513	Deep Crk.	8/15/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2514	Deep Crk.	8/16/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2515	Deep Crk.	8/17/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2516	Deep Crk.	8/18/2002	NO TAG					
02DT2517	Deep Crk.	8/19/2002	NO TAG					
02DT2517	Deep Crk.	8/19/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2518	Deep Crk.	8/20/2002	NO TAG					
02DT2518	Deep Crk.	8/20/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2518	Deep Crk.	8/20/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2518	Deep Crk.	8/20/2002	NO TAG					
02DT2519	Deep Crk.	8/21/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2519	Deep Crk.	8/21/2002	NO TAG					

-continued-

Appendix B2.-Page 2 of 2.

Sample#	Recovery Location	Recovery Date	Tag Code ^a	Brood Year	State or Province	Rearing Code and Location	Release Date	Release Location
02DT2519	Deep Crk.	8/21/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2519	Deep Crk.	8/21/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2519	Deep Crk.	8/21/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2519	Deep Crk.	8/21/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2519	Deep Crk.	8/21/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2520	Deep Crk.	8/22/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2520	Deep Crk.	8/22/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2520	Deep Crk.	8/22/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2520	Deep Crk.	8/22/2002	NO TAG					
02DT2520	Deep Crk.	8/22/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2521	Deep Crk.	8/23/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2521	Deep Crk.	8/23/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2521	Deep Crk.	8/23/2002	NO TAG					
02DT2521	Deep Crk.	8/23/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2521	Deep Crk.	8/23/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2521	Deep Crk.	8/23/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2522	Deep Crk.	8/24/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2523	Deep Crk.	8/25/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2526	Deep Crk.	8/28/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2526	Deep Crk.	8/28/2002	NO TAG					
02DT2527	Deep Crk.	8/29/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2528	Deep Crk.	8/30/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2528	Deep Crk.	8/30/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2529	Deep Crk.	8/31/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2529	Deep Crk.	8/31/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2529	Deep Crk.	8/31/2002	NO TAG					
02DT2529	Deep Crk.	8/31/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2529	Deep Crk.	8/31/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2529	Deep Crk.	8/31/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2529	Deep Crk.	8/31/2002	NO TAG					
02DT2530	Deep Crk.	9/1/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2532	Deep Crk.	9/3/2002	NO TAG					
02DT2533	Deep Crk.	9/4/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2535	Deep Crk.	9/6/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2536	Deep Crk.	9/7/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2538	Deep Crk.	9/9/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2538	Deep Crk.	9/9/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2538	Deep Crk.	9/9/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2538	Deep Crk.	9/9/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2538	Deep Crk.	9/9/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20
02DT2538	Deep Crk.	9/9/2002	1301030813	1998	AK	(W) Deep Crk.	7/21/2001	Deep Ck. 244-20

^a No tag indicates adipose finclip coho lost its tag between time of tagging as smolt and recapture as adult.